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the customer is still available, then the customer can immediately correct or supplement the location information. In the case of problem reporting, if the BTA or other geographic region which contains the problem location can be determined quickly, the problem is more likely to be resolved during the initial problem report, eliminating the need for a subsequent customer call-back. Real time determination also provides valuable information for system analysis and resource allocation.

Accordingly, in the field of geographic coding, there is a need for a system and method for identifying the geographic region of a geographic area which contains a geographic zone.

There is an additional need for a system and method for identifying the geographic region of a geographic area which contains a geographic zone in real time.

SUMMARY OF THE INVENTION

The present invention provides a system and method for identifying the geographic region of a geographic area which contains a geographic zone associated with a location. To implement this system and method, longitude and latitude for a geographic zone associated with a location are obtained. A geographic zone, such as a zip code zone, may be associated with a location if the geographic zone approximates the location. Longitude and latitude for the zone boundary points define a geographic zone and are used to identify the geographic region of a geographic area which contains a geographic zone associated with the location.

The geographic area is divided into a plurality of non-overlapping geographic regions. To identify the geographic region which contains a geographic zone, generally one of the geographic regions is selected as a selected region. A determination is made as to whether the geographic zone is located within the selected region. If the determination is that the geographic zone is located within the selected region, then the selected region is identified.

Advantageously, the present invention provides a system and method for the identification of the geographic region which contains a geographic zone in real time. Such an identification in real time is very useful. In systems using geographic coding, real time identification of the geographic region which contains a geographic zone provides valuable information for system analysis and resource allocation. Real time determination also provides early detection of errors in geographic zone information. The failure to identify a geographic region that contains a geographic zone when the geographic zone is located within that geographic area indicates that the geographic zone information is erroneous. If the error can be detected in real time, it is easier to obtain corrected or supplemental information.

The present invention provides several preferred methods for identifying the geographic region of a geographic area which contains a geographic zone. The preferred methods may be divided into two groups. One group of preferred methods uses estimated geographic regions to identify the geographic region of a geographic area which contains a geographic zone. The other group of preferred methods does not use estimated geographic regions. An estimated geographic region approximates or estimates the general size of a geographic region by a regular-shaped estimated geographic region. A description of the group of preferred methods which does not use estimated geographic regions is presented first.

Boundary Point Pair Method

With respect to the group of preferred methods which does not use estimated regions, one of the preferred methods

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begins by dividing the geographic area into a plurality of non-overlapping geographic regions. One of the plurality of zone boundary points is selected as a selected zone boundary point and one of the plurality of non-overlapping geographic regions is selected as a selected region. A first determination is made as to whether the selected zone boundary point is located within the selected region. The determination is made by drawing a line of predetermined slope through the selected zone boundary point and through the selected region so that the line intersects the boundary of the selected region at a first boundary point and at a second boundary point. The first determination also includes checking whether the selected zone boundary point lies on the line between the first boundary point and the second boundary point. If the selected zone boundary point lies on the line between the first boundary point and the second boundary point, then the first determination is that the selected zone boundary point is located within the selected region.

If the first determination is that the selected zone boundary point is located within the selected region, then another one of the zone boundary points is selected as a selected zone boundary point and the step of making a first determination as to whether the selected zone boundary point is located within the selected region is repeated. If at least a predetermined percentage of the zone boundary points is located within the selected region, then the selected region is identified. If each geographic region has a name, then preferably, the step of identifying the selected region includes identifying the selected region by the name of the selected region.

If the selected zone boundary point does not lie on the line between the first boundary point and the second boundary point, then preferably the first determination is that the selected zone boundary point is not located within the selected region. If the selected zone boundary point is not located within the selected region, then preferably another one of the geographic regions is selected as the selected region and another first determination is made as to whether the selected zone boundary point is located within that selected region. These steps are repeated until the first determination is that the selected zone boundary point is located within the selected region.

Single Boundary Point Method

In another one of the preferred methods to identify the geographic region which contains a geographic zone, the geographic area is divided into a plurality of non-overlapping geographic regions. One of the plurality of zone boundary points is selected as a selected zone boundary point and one of the plurality of non-overlapping geographic regions is selected as a selected region. A first determination is made as to whether the selected zone boundary point is located within the selected region. The first determination is made by drawing a line of predetermined slope through the selected zone boundary point and through the selected region. If the line intersects the boundary of the selected region at the selected zone boundary point, then the first determination is that the selected zone boundary point is located within the selected region. If the first determination is that the selected zone boundary point is located within the selected region, then another zone boundary point is selected as a selected zone boundary point and a second determination is made as to whether the selected zone boundary point is located within the selected region.

If at least a predetermined percentage of the plurality of zone boundary points is located within the selected region, the selected region is identified. If each geographic region has a name, then the step of identifying the selected region